

**ATTACHMENT B4**

**TRU MIXED WASTE CHARACTERIZATION USING  
ACCEPTABLE KNOWLEDGE**

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## ATTACHMENT B4

### TRU MIXED WASTE CHARACTERIZATION USING ACCEPTABLE KNOWLEDGE

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## ATTACHMENT B4 TRU MIXED WASTE CHARACTERIZATION USING ACCEPTABLE KNOWLEDGE

### B4-1 Introduction

The Resource Conservation and Recovery Act (**RCRA**) regulations codified in 40 CFR Parts 260 through 265, 268, and 270, and the New Mexico Hazardous Waste Management Regulations in Title 20 New Mexico Administrative Code, Chapter 4, Part 1, (20.4.1 NMAC) Subparts I through VI, Subpart VIII, and Subpart IX, authorize the use of acceptable knowledge (**AK**) in appropriate circumstances by waste generators, or treatment, storage, or disposal facilities to characterize hazardous waste. Acceptable knowledge is described in *Waste Analysis: EPA Guidance Manual for Facilities That Generate, Treat, Store and Dispose of Hazardous Waste* (EPA, 1994). Acceptable knowledge, as an alternative to sampling and analysis, can be used to meet all or part of the waste characterization requirements under the RCRA (EPA, 1994).

Acceptable knowledge includes a number of techniques used to characterize transuranic (**TRU**) mixed waste, such as process knowledge, records of analysis acquired prior to RCRA, and other supplemental sampling and analysis data (EPA, 1994). Radiography and/or visual examination, headspace gas sampling and analysis, and homogeneous waste sampling and analysis (specified in Permit Attachment B1) are used to acquire supplemental sampling and analysis data to meet the requirements of the Waste Analysis Plan (**WAP**) specified in Permit Attachment B. Acceptable knowledge is used in TRU mixed waste characterization activities in three ways:

- To delineate TRU mixed waste streams
- To assess if TRU mixed heterogeneous debris wastes exhibit a toxicity characteristic (20.4.1.200 NMAC, incorporating 40 CFR §261.24)
- To assess if TRU mixed wastes are listed (20.4.1.200 NMAC, incorporating 40 CFR §261.31)

Sampling and analysis shall be performed to confirm acceptable knowledge and to update and modify initial AK assessments. Sampling and analysis includes radiography, visual examination, headspace gas, and homogeneous waste sampling and analysis. TRU mixed waste streams shall undergo applicable provisions of the acceptable knowledge process prior to management, storage, or disposal by the Permittees at WIPP.

### B4-2 Acceptable Knowledge Documentation

The Permittees shall obtain from each Department of Energy (**DOE**) TRU mixed waste generator/storage site (**site**) a logical sequence of acceptable knowledge information that progresses from general facility information (TRU Mixed Waste Management Program Information) to more detailed waste-specific information (TRU Mixed Waste Stream Information). Traceability of acceptable knowledge information for a select drum in the audited

Waste Summary Category Group(s) will be examined during the Permittees' audit of a site (Section B4-3f). The consistent presentation of acceptable knowledge documentation among sites in auditable records<sup>1</sup> will allow Waste Isolation Pilot Plant (**WIPP**) personnel to verify the completeness and adequacy of acceptable knowledge for TRU mixed waste characterization during the audit process. The Permittees shall implement the acceptable knowledge process as specified in this Permit to characterize TRU mixed wastes. NMED may independently validate the implementation of and compliance with applicable provisions of the WAP at each generator/storage site by participation in the Permittees' Audit and Surveillance Program (Permit Attachment B6). The Permittees shall provide NMED with current audit schedules and notify NMED in writing no later than thirty (30) calendar days prior to each audit. NMED may choose to accompany the Permittees on any audit of the WAP implementation.

The following sections include the information the Permittees will require for each site to characterize TRU mixed waste using acceptable knowledge. Because waste generating processes are site-specific, sites shall, as necessary, supplement the required acceptable knowledge records with additional information (see Section B4-2c, Supplemental Acceptable Knowledge Information). If the required information is not available for a particular waste, supplemental information shall be obtained and the waste will not be accepted for management, storage, or disposal at the WIPP facility as a retrievably stored waste (i.e., the waste will be characterized as specified in Permit Attachment B, Section B-3d(1)).

#### B4-2a Required TRU Mixed Waste Management Program Information

TRU mixed waste management program information shall clearly define waste categorization schemes and terminology, provide a breakdown of the types and quantities of TRU mixed waste that are generated and stored at the site, and describe how waste is tracked and managed at the site, including historical and current operations. Information related to TRU mixed waste certification procedures and the types of documentation (e.g., waste profile forms) used to summarize acceptable knowledge shall also be provided. The following information shall be included as part of the acceptable knowledge written record:

- Map of the site with the areas and facilities involved in TRU mixed waste generation, treatment, and storage identified
- Facility mission description as related to TRU mixed waste generation and management (e.g., nuclear weapons research may involve metallurgy, radiochemistry, and nuclear physics operations that result in specific waste streams)
- Description of the operations that generate TRU mixed waste at the site (e.g., plutonium recovery, weapons design, or weapons fabrication)
- Waste identification or categorization schemes used at the facility (e.g., item description codes, content codes)

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<sup>1</sup> "Auditable records" mean those records which allow the Permittees to conduct a systematic assessment, analysis, and evaluation of the Permittees compliance with the WAP and this Permit.

- Types and quantities of TRU mixed waste generated, including historical generation through future projections
- Correlation of waste streams generated from the same building and process, as appropriate (e.g., sludge, combustibles, metals, and glass)
- Waste certification procedures for retrievably stored and newly generated wastes to be sent to the WIPP facility

#### B4-2b Required TRU Mixed Waste Stream Information

The Permittees may use acceptable knowledge to delineate site-specific waste streams. For each TRU mixed waste stream, the Permittees shall require sites to compile all process information and data that support the acceptable knowledge used to characterize that waste stream. The type and quantity of supporting documentation will vary by waste stream, depending on the process generating the waste and site-specific requirements imposed by the Permittees. At a minimum, the waste process information shall include the following written information:

- Area(s) and/or building(s) from which the waste stream was or is generated
- Waste stream volume and time period of generation (e.g., 100 standard waste boxes of retrievable stored waste generated from June 1977 through December 1977)
- Waste generating process described for each building (e.g., batch waste stream generated during decommissioning operations of glove boxes), including processes associated with U134 waste generation, if applicable.
- Process flow diagrams (e.g., a diagram illustrating glove boxes from a specific building to a size reduction facility to a container storage area). In the case of research/development, analytical laboratory waste, or other similar processes where process flow diagrams cannot be created, a description of the waste generating processes, rather than a formal process flow diagram, may be included if this modification is justified and the justification is placed in the auditable record
- Material inputs or other information that identifies the chemical content of the waste stream and the physical waste form (e.g., glove box materials and chemicals handled during glove box operations; data obtained through visual examination of newly generated waste that later undergoes radiography; information demonstrating neutralization of U134 [hydrofluoric acid] and waste compatibility, etc.)

The acceptable knowledge written record shall include a summary that identifies all sources of waste characterization information used to delineate the waste stream. The basis and rationale for delineating each waste stream, based on the parameters of interest, shall be clearly summarized and traceable to referenced documents. Assumptions made in delineating each

waste stream also shall be identified and justified. If discrepancies exist between required information, then sites shall apply all hazardous waste codes indicated by the information to the subject waste stream unless the sites choose to justify an alternative assignment and document the justification in the auditable record. The Permittees shall obtain from each site, at a minimum, procedures that comply with the following acceptable knowledge requirements:

- Procedures for identifying and assigning the physical waste form of the waste
- Procedures for delineating waste streams and assigning Waste Matrix Codes
- Procedures for resolving inconsistencies in acceptable knowledge documentation
- Procedures for confirming acceptable knowledge information through headspace gas sampling and analysis, visual examination and/or radiography, and homogeneous waste sampling and analysis
- Procedures describing management controls used to ensure prohibited items (specified in the WAP, Permit Attachment B) are documented and managed
- Procedures to ensure radiography and visual examination include a list of prohibited items that the operator shall verify are not present in each container of waste (e.g., liquids exceeding TSDF-WAC limits, corrosives, ignitables, reactives, and incompatible wastes)
- Procedures to document how changes to Waste Matrix Codes, waste stream assignment, and associated EPA hazardous waste numbers based on material composition are documented for any waste
- Procedures for newly generated waste shall describe how acceptable knowledge is confirmed using either the visual examination technique or radiography (or VE in lieu of radiography). Procedures shall also describe the criteria for selecting either radiography or VE to ensure there is documentation and adequate justification of the process selected

#### B4-2c Supplemental Acceptable Knowledge Information

The generator/storage sites shall obtain supplemental acceptable knowledge information. The amount and type of supplemental information is site-specific and cannot be mandated, but sites shall collect information as appropriate to support required information. Adequacy of supplemental information shall be assessed by the Permittees during audits (Section B4-3f). Sites will use this information to compile the acceptable knowledge written record. Supplemental acceptable knowledge documentation that may be used (if available) in addition to the required information specified above include, but are not limited to, the following information:

- Process design documents (e.g., Title II Design)



- Standard operating procedures that may include a list of raw materials or reagents, a description of the process or experiment generating the waste, and a description of wastes generated and how the wastes are managed at the point of generation
- Preliminary and final safety analysis reports and technical safety requirements
- Waste packaging logs
- Test plans or research project reports that describe reagents and other raw materials used in experiments
- Site databases (e.g., chemical inventory database for Superfund Amendments and Reauthorization Act Title III requirements)
- Information from site personnel (e.g., documented interviews)
- Standard industry documents (e.g., vendor information)
- Analytical data relevant to the waste stream, including results from fingerprint analyses, spot checks, or routine verification sampling. This may also include new information acquired apart from the confirmatory process which supplements required information (e.g., visual examination not performed in compliance with the WAP)
- Material Safety Data Sheets, product labels, or other product package information
- Sampling and analysis data from comparable or surrogate waste streams (e.g., equivalent nonradioactive materials)
- Laboratory notebooks that detail the research processes and raw materials used in an experiment

For waste containers that belong to LANL sealed sources waste streams and meet the criteria of Permit Attachment B, Section B-3a(1)(iii), the following information is required as part of the AK documentation:

- Documentation that the waste container contents meet the definition of sealed sources per 10 CFR §30.4 and 10 CFR §835.2 (effective January 1, 2004).
- Documentation of the certification of the sealed sources as U.S. Department of Transportation Special Form Class 7 (Radioactive) Material per 49 CFR §173.403 (effective October 1, 2003).
- Documentation of contamination survey results that validate the integrity of each sealed source per 10 CFR §34.27 (effective January 1, 2004).

- AK documentation does not indicate the use of VOCs or VOC-bearing materials as constituents of the sealed sources.
- The outer casing of each sealed source must be of a non-VOC bearing material, which must be verified using the VE technique at the time of packaging.
- AK Documentation shall also include but shall not be limited to, as available and as necessary to determine the hazardous constituents associated with sealed sources, the following: source manufacturer's sales catalogues, original purchase records, source manufacturer's fabrication documents, source manufacturer's drawings, source manufacturer's fuel capture assembly reports, source manufacturer's operational procedures for cleanliness requirements, source manufacturer's shipping documents, source manufacturer's welding records, transuranic batch material records, and information from national databases (e.g., NMMSS). All of this information may not and need not be available for each source, but sufficient information must be included in the auditable record to derive an adequate understanding of source construction and history to ensure that no VOCs are present in association with the sealed source itself that would render the source hazardous. If AK data indicate that assignment of a hazardous waste number related to organic materials is required in association with a source, this specific source will be subject to headspace gas sampling.

All specific, relevant supplemental acceptable knowledge documentation assembled and used in the acceptable knowledge process, whether it supports or contradicts any required acceptable knowledge documentation, shall be identified and an explanation provided for its use (e.g., identification of a toxicity characteristic). Supplemental documentation may be used to further document the rationale for the hazardous characterization results. The collection and use of supplemental information shall be assessed by the Permittees during site audits to ensure that hazardous waste characterization is supported, as necessary, by supplemental information. Similar to required information, if discrepancies exist between supplemental information and the required information, then sites shall apply all hazardous waste codes indicated by the supplemental information to the subject waste stream unless the sites choose to justify an alternative assignment and document the justification in the auditable record.

#### B4-3 Acceptable Knowledge Training, Procedures and Other Requirements

The Permittees shall require consistency among sites in using acceptable knowledge information to characterize TRU mixed waste by the use of the following three phase process: 1) compiling the required and supplemental acceptable knowledge documentation in an auditable record, 2) confirming and updating acceptable knowledge information using radiography and/or visual examination, headspace-gas sampling and analysis, and homogeneous waste sampling and analysis, and 3) auditing acceptable knowledge records. This section specifies qualification and training requirements, describes each phase of the process, specifies the procedures that the Permittees shall require all sites to develop to implement the requirements for using acceptable knowledge, and specifies data quality requirements for acceptable knowledge.

1 B4-3a Qualifications and Training Requirements

2 Site personnel responsible for compiling acceptable knowledge, assessing acceptable  
3 knowledge, and resolving discrepancies associated with acceptable knowledge shall be  
4 qualified and trained in the following areas at a minimum:

- 5 ● WIPP WAP in Permit Attachment B and the Treatment, Storage and Disposal  
6 Facility Waste Acceptance Criteria (**TSDF-WAC**) specified in this permit
- 7 ● State and Federal RCRA regulations associated with solid and hazardous waste  
8 characterization
- 9 ● Discrepancy resolution and reporting processes
- 10 ● Site-specific procedures associated with waste characterization using acceptable  
11 knowledge

12 B4-3b Acceptable Knowledge Assembly, Compilation, and Confirmation Procedures and  
13 Required Administrative Controls

14 The Permittees shall obtain from sites acceptable knowledge procedures which require  
15 consistent application of the acceptable knowledge process and requirements. Site-specific  
16 acceptable knowledge procedures shall address the following:

- 17 ● Sites shall prepare and implement a written procedure outlining the specific  
18 methodology used to assemble acceptable knowledge records, including the  
19 origin of the documentation, how it will be used, and any limitations associated  
20 with the information (e.g., identify the purpose and scope of a study that included  
21 limited sampling and analysis data).
- 22 ● Sites shall develop and implement a written procedure to compile the required  
23 acceptable knowledge record.
- 24 ● Sites shall develop and implement a written procedure that ensures  
25 unacceptable wastes (e.g., reactive, ignitable, corrosive) are identified and  
26 segregated from TRU mixed waste populations sent to WIPP.
- 27 ● Sites shall prepare and implement a written procedure to evaluate acceptable  
28 knowledge and resolve discrepancies. If different sources of information indicate  
29 different hazardous wastes are present, then sites shall include all sources of  
30 information in its records and conservatively assign all potential hazardous waste  
31 codes unless the sites choose to justify an alternative assignment and document  
32 the justification in the auditable record. The assignment of hazardous waste  
33 codes shall be tracked in the auditable record to all required documentation.
- 34 ● Sites shall prepare and implement a written procedure to identify hazardous  
35 wastes and assign the appropriate hazardous waste codes to each waste  
36 stream. The following are minimum baseline requirements/standards that site-

specific procedures shall include to ensure comparable and consistent characterization of hazardous waste:

- Compile all of the required information in an auditable record.
- Review the required information to determine if the waste is listed under 20.4.1.200 NMAC (incorporating 40 CFR §261), Subpart D. Assign all listed hazardous waste codes unless the sites choose to justify an alternative assignment and document the justification in the auditable record.
- Review the required information to determine if the waste may contain hazardous constituents included in the toxicity characteristics specified in 20.4.1.200 NMAC (incorporating 40 CFR §261), Subpart C. If a toxicity characteristic contaminant is identified and is not included as a listed waste, assign the toxicity characteristic code unless data are available that demonstrate that the concentration of the constituent in the waste is less than the toxicity characteristic regulatory level. When data are not available, the toxicity characteristic hazardous waste code for the identified hazardous constituent shall be applied to the mixed waste stream.

For newly generated wastes, procedures shall be developed and implemented to characterize hazardous waste using acceptable knowledge prior to packaging the waste.

- Sites shall develop and implement a written procedure for the confirmation of acceptable knowledge in accordance with Section B4-3(d).
- Sites shall prepare and implement a written procedure that provides a cross reference to the applicable waste summary category group (i.e., S3000, S4000, and S5000) to verify all of the required confirmation data has been evaluated and the proper hazardous waste codes have been assigned.
- Sites shall ensure that results of other audits of the TRU mixed waste characterization programs at the site are available in the records.

Furthermore, the Permittees shall require the sites to implement procedure(s) which specify the administrative controls used by the site to ensure that prohibited items are documented and managed in accordance with site-specific certification plans. The following minimum elements shall be addressed in site-specific documentation associated with administrative controls:

- Identify the organization(s) responsible for compliance with administrative controls.
- Identify the oversight procedures and frequency of actions to verify compliance with administrative controls.

- Develop on-the-job training specific to administrative control procedures.
- Ensure that personnel may stop work if noncompliance with administrative controls is identified.
- Develop a nonconformance process that complies with the requirements in Section B3 of the WAP to document and establish corrective actions.
- As part of the corrective action process, assess the potential time frame of the noncompliance, the potentially affected waste population(s), and the reassessment and recertification of those wastes.

#### B4-3c Criteria for Assembling an Acceptable Knowledge Record and Delineating the Waste Stream

Figure B4-1 provides an overview of the process for assembling acceptable knowledge documentation into an auditable record. The first step is to assemble all of the required acceptable knowledge information and any supplemental information regarding the materials and processes that generate a specific waste stream. The Permittees shall require the sites to implement procedures which comply with the following criteria to establish acceptable knowledge records:

- Acceptable knowledge information shall be compiled in an auditable record, including a road map for all applicable information.
- The overview of the facility and TRU mixed waste management operations in the context of the facility's mission shall be correlated to specific waste stream information.
- Correlations between waste streams, with regard to time of generation, waste generating processes, and site-specific facilities shall be clearly described. For newly generated wastes, the rate and quantity of waste to be generated shall be defined.
- A reference list shall be provided that identifies documents, databases, Quality Assurance protocols, and other sources of information that support the acceptable knowledge information.

Container inventories for TRU mixed waste currently in retrievable storage shall be delineated into waste streams by correlating the container identification to all of the required acceptable knowledge information and any supplemental acceptable knowledge information.

#### B4-3d Requirements for Confirmation of Acceptable Knowledge Information

Acceptable knowledge includes information regarding the physical form of the waste, the base materials composing the waste, and the process that generates the waste. Waste characterization (i.e., radiography or visual examination, headspace-gas sampling and analysis, and homogeneous waste sampling and analysis) will be used to confirm acceptable knowledge

information. Figure B4-2 illustrates the process the Permittees shall require sites to use to confirm acceptable knowledge.

Acceptable knowledge characterization results shall be confirmed for both retrievably stored and newly generated waste. All retrievably stored waste shall be characterized using radiography or visual examination to confirm the Waste Matrix Code and waste stream and certify compliance with the WAP (Permit Attachment B). If a site must repackage its retrievably stored waste, either the visual examination technique prior to or during waste packaging or radiography (or VE in lieu of radiography) after waste packaging shall be used to confirm acceptable knowledge information.

For newly generated wastes, sites that elect to confirm AK during packaging of newly generated waste shall have written procedures to document the confirmation of acceptable knowledge information with the visual examination technique prior to or during waste packaging. The following minimum requirements shall be addressed in site-specific procedures:

- scope (i.e., waste streams) and purpose;
- responsible organization(s);
- administrative process controls;
- material inputs to process;
- process controls and range of operation that affect final hazardous waste characterization;
- rate and quantity of the hazardous waste generated;
- list of applicable operating procedures relevant to the hazardous waste characterization;
- process knowledge verification sampling (i.e., headspace-gas sampling and/or homogeneous waste annual sampling); and
- reporting and records management.

The Permittees shall require sites to establish procedures for reevaluating acceptable knowledge if radiography or visual examination results in the assignment of a different Waste Matrix Code [e.g., Plastic/Rubber (S5310) versus Paper/Cloth (S5330)]. Site procedures shall describe how the waste is reassigned, acceptable knowledge reevaluated, and appropriate hazardous waste codes assigned. If a waste must be assigned to a different Waste Matrix Code based on radiography or visual examination, the following minimum steps shall be taken to reevaluate acceptable knowledge:

- Review existing information based on the container identification number and document all differences in hazardous waste code assignments

- If differences exist in the hazardous waste codes that were assigned, reassess and document all required acceptable knowledge information (Section B4-3b) associated with the new designation
- Reassess and document all sampling and analytical data associated with the waste
- Verify and document that the reassigned Waste Matrix Code was generated within the specified time period, area and buildings, waste generating process, and that the process material inputs are consistent with the waste material parameters identified during radiography or visual examination
- Record all changes to acceptable knowledge records
- If discrepancies exist in the acceptable knowledge information for the reassigned Waste Matrix Code, document the segregation of this container, and define the actions necessary to fully characterize the waste

Potential toxicity characteristics for base materials that compose TRU mixed heterogeneous debris (S5000) waste may be determined without destructive sampling and analysis via acceptable knowledge. Sites will assign a Waste Matrix Code and waste stream to each container of waste using acceptable knowledge. In lieu of confirmatory sampling and analytical or other data to the contrary (including headspace gas and total/TCLP analysis of solids/soils), sites shall assign the toxicity characteristic hazardous waste codes based on the presence of the constituent identified by acceptable knowledge, regardless of the quantity or concentration. Radiography or visual examination shall be used to confirm the Waste Matrix Code and waste stream identified using acceptable knowledge. If the waste stream designation is so detailed that the specific components cannot be differentiated by radiography (e.g., a waste stream based on a specific type of plastic), this waste stream confirmation need not be performed and this omission shall be explained in the auditable record. Procedures shall describe how discrepancies in the Waste Matrix Code are recorded and additions to hazardous waste codes based on material composition are documented, as necessary (Section B4-3b).

With the exception of qualifying LANL sealed sources waste containers, headspace-gas sampling and analysis shall be conducted on all TRU mixed waste or randomly selected containers from waste streams that meet the conditions for reduced headspace gas sampling listed in Permit Attachment B, Section B-3a(1), to be sent to the WIPP facility. The LANL sealed sources waste containers that meet specified conditions must be assigned VOC concentration values in accordance with Section B-3a(1)(iii). Headspace-gas data will be used to confirm the presence or absence of volatile organic compounds (**VOCs**) identified using acceptable knowledge.

The Permittees shall require sites to use acceptable knowledge to identify spent solvents associated with each TRU mixed waste stream or waste stream lot. Headspace-gas data will then be used to confirm acceptable knowledge concerning the presence or absence of F-listed solvents and concentration of applicable toxicity characteristic solvents. Sites shall confirm the assignment of F-listed hazardous waste codes (20.4.1.200 NMAC, incorporating 40 CFR

§261.31) by evaluating the average concentrations of each VOC detected in container headspace gas for each waste stream or waste stream lot using the upper 90 percent confidence limit (**UCL<sub>90</sub>**). The **UCL<sub>90</sub>** for the mean concentration shall be compared to the program required quantitation limit (**PRQL**) for the constituent. If the **UCL<sub>90</sub>** for the mean concentration exceeds the **PRQL**, sites shall reevaluate their acceptable knowledge information and determine the potential source of the constituent. Sites shall provide documentation to support any determination that F-listed organic constituents are associated with packaging materials, radiolysis, or other uses not consistent with solvent use. If the source of the detected F-listed solvents can not be identified, the appropriate spent solvent hazardous waste code will be conservatively applied to the waste stream. In the case of applicable toxicity characteristic VOCs and non-toxic F003 constituents, generator/storage sites may assess whether the headspace gas concentration would render the waste non-hazardous for those characteristics and change the initial acceptable knowledge determination accordingly.

Hazardous wastes associated with S3000 and S4000 waste streams will be verified based on the results of the total/TCLP analysis of a representative homogeneous waste sample. If discrepancies between the results obtained from homogeneous waste sampling and analysis and headspace-gas sampling and analysis exist (i.e., a VOC is detected in the solidified waste but not in the headspace), the most conservative results will be used to verify acceptable knowledge and assign hazardous waste codes, as applicable. As with headspace gas, if the total/TCLP results indicate that the concentration of a characteristic waste or non-toxic constituent of an F003 waste is below regulatory levels, the hazardous waste code assigned initially by acceptable knowledge may be changed as part of the confirmatory process. Otherwise, if an F-listed waste constituent is detected, the appropriate hazardous waste code shall be applied.

If the confirmatory process determines that the source of the F-listed constituent is a spent solvent used in the process or is determined to be the result of mixing a listed waste with a solid waste during waste packaging, or applicable toxicity characteristic or non-toxic F003 wastes are present in excess of regulatory levels, then the site will either: 1) assign the applicable listed hazardous waste code to the entire waste stream, or 2) segregate the drums containing detectable concentrations of the solvent into a separate waste stream and assign applicable hazardous waste codes. Each site shall document, justify, and consistently delineate waste streams and assign hazardous waste codes based on site-specific permit requirements and other state-enforced agreements.

To determine the mean concentration of solvent VOCs, all headspace-gas data and homogeneous waste data for a waste stream or waste stream lot (i.e., the portion of the waste stream that is characterized as a unit) will be used, including data qualified with a 'J' flag (i.e., less than the **PRQL** but greater than the method detection limit [**MDL**]) or qualified with a 'U' flag (i.e., undetected). For data qualified with a 'U' flag, sites shall use one-half the MDL in calculating the mean concentration. Because listed wastes are not defined based on concentration, sites may not remove hazardous waste codes assigned using acceptable knowledge if hazardous constituents are not detected in the headspace gas or solids/soil analysis.

TRU mixed headspace gases and homogeneous waste matrices may contain one or two constituents (e.g., carbon tetrachloride and 1,1,1-trichloroethane) at concentrations that are



orders of magnitude higher than the other target analytes. In these cases, samples shall be diluted to remain within the instrument calibration range for the elevated constituents. Sample dilution results in elevated MDLs for the constituents with elevated concentrations. Only the concentrations of detected constituents will be used to calculate the mean for the purpose of assigning F-listed hazardous waste codes. Because the presence or absence of F-listed solvents can not be confirmed based on the artificially high MDLs that are caused by sample dilution, data flagged as 'U' and showing an elevated MDL will not be used in calculating the mean concentration.

#### B4-3e Acceptable Knowledge Data Quality Requirements

The data quality objectives for sampling and analysis techniques are provided in Permit Attachment B3. Analytical results will be used to confirm the characterization of wastes based on acceptable knowledge. To ensure that the acceptable knowledge process is consistently applied, the Permittees shall require sites to comply with the following data quality requirements for acceptable knowledge documentation:

- Precision - Precision is the agreement among a set of replicate measurements without assumption of the knowledge of a true value. The qualitative determinations, such as compiling and assessing acceptable knowledge documentation, do not lend themselves to statistical evaluations of precision. Therefore, precision requirements are not established for acceptable knowledge.
- Accuracy - Accuracy is the degree of agreement between an observed sample result and the true value. The percentage of waste containers which require reassignment to a new Waste Matrix Code and/or designation of different hazardous waste codes based on the reevaluation of acceptable knowledge or on obtaining sampling and analysis data will be reported as a measure of acceptable knowledge accuracy.
- Completeness - Completeness is an assessment of the number of waste streams or number of samples collected to the number of samples determined to be useable through the data validation process. The acceptable knowledge record shall contain 100 percent of the information specified in Section B4-2. The useability of the acceptable knowledge information will be assessed for completeness during audits.
- Comparability - Data are considered comparable when one set of data can be compared to another set of data. Comparability is ensured through sites meeting the training requirements and complying with the minimum standards outlined for procedures that are used to implement the acceptable knowledge process. All sites shall assign hazardous waste codes in accordance with Section B4.3b and provide this information regarding its waste to other sites who store or generate a similar waste stream.
- Representativeness - Representativeness expresses the degree to which sample data accurately and precisely represent characteristics of a population. Representativeness is a qualitative parameter that will be satisfied by ensuring

that the process of obtaining, evaluating, and documenting acceptable knowledge information is performed in accordance with the minimum standards established in Section B4-3b. Sites also shall assess and document the limitations of the acceptable knowledge information used to assign hazardous waste codes (e.g., purpose and scope of information, date of publication, type and extent to which waste parameters are addressed and limitations of information in identifying hazardous wastes).

Each site shall address quality control by tracking its performance with regard to the use of acceptable knowledge by: 1) assessing the frequency of inconsistencies among information, and 2) documenting the results of acceptable knowledge confirmation through radiography or visual examination, headspace-gas analyses, and homogeneous waste analyses. In addition, the acceptable knowledge process and waste stream documentation shall be evaluated through internal assessments by quality assurance organizations and assessments by auditors or observers external to the organization (i.e., DOE/Carlsbad Field Office (**CBFO**), NMED, EPA).

#### B4-3f Audits of Acceptable Knowledge

The Permittees will conduct an initial audit of each site prior to certifying the site for shipment of TRU mixed waste to the WIPP facility. This initial audit will establish an approved baseline that will be reassessed annually by the Permittees. These audits will verify compliance with the requirements specified in the WAP (Permit Attachment B). The audits will be used to verify compliance with the compilation, application, and interpretation requirements of acceptable knowledge information specified in this Permit at all sites, and to evaluate the completeness and defensibility of site-specific acceptable knowledge documentation related to hazardous waste characterization. Permit Attachment B6 gives a description of the overall audit program and a required checklist. Figure B4-3 includes the primary steps associated with the audit process of acceptable knowledge.

Site-specific audit plans will be prepared by the Permittees and provided to NMED, and will identify the scope of the audit, requirements to be assessed, participating personnel, activities to be audited, organizations to be notified, applicable documents, and schedule. Audits will be performed in accordance with written procedures and site-specific checklists that will be developed by the Permittees prior to the audit and provided to NMED. The site-specific audit checklists will include items associated with the compilation and evaluation of the required acceptable knowledge information as specified in the checklist required by Permit Attachment B6.

Audit checklists shall include Table B6-3 in Permit Attachment B6, and will include but not be limited to the following elements for review during the audit:

- Documentation of the process used to compile, evaluate, and record acceptable knowledge is available and implemented;
- Personnel qualifications and training are documented;
- All of the required acceptable knowledge documentation specified in Section B4-2 has been compiled in an auditable record;

- All of the required procedures specified in B4-3 have been developed and implemented, including but not limited to:
  - A procedure exists for assigning hazardous waste codes to waste streams in accordance with Section B4-3;
  - A procedure exists for resolving discrepancies in acceptable knowledge documentation in accordance with Section B4-3;
  - A procedure exists for confirming acceptable knowledge information through: a) radiography or visual examination, b) headspace gas sampling and analysis, and c) homogeneous waste sampling and analysis in accordance with Section B4-3; and
- Results of other audits of the TRU mixed waste characterization programs at the site are available in site records.

Members of the audit team will be knowledgeable regarding the required acceptable knowledge information, RCRA regulations and EPA guidance regarding the use of acceptable knowledge for waste characterization, RCRA hazardous waste characterization, and the WAP requirements (Permit Attachment B). Audit team members will be independent of all TRU mixed waste management operations at the site being audited.

Auditors will evaluate acceptable knowledge documentation for at least one waste stream from the Summary Category Group(s) being audited, and will audit acceptable knowledge traceability for at least one container from the audited Summary Category Group(s). For these waste streams, auditors will review all procedures and associated processes developed by the site for documenting the process of compiling acceptable knowledge documentation; correlating information to specific waste inventories; assigning hazardous waste codes; and identifying, resolving, and documenting discrepancies in acceptable knowledge records. The adequacy of acceptable knowledge procedures and processes will be assessed and any deficiencies in procedures documented in the audit report.

Auditors will review the acceptable knowledge documentation for selected waste streams for logic, completeness, and defensibility. The criteria that will be used by auditors to evaluate the logic and defensibility of the acceptable knowledge documentation include completeness and traceability of the information, consistency of application of information, clarity of presentation, degree of compliance with this Permit Attachment with regard to acceptable knowledge confirmation data, nonconformance procedures, and oversight procedures. Auditors will evaluate compliance with written site procedures for developing the acceptable knowledge record. A completeness review will evaluate the availability of all required TRU mixed waste management program information and TRU mixed waste stream information (Section B4-2). Records will be reviewed for correlation to specific waste streams and the basis for characterizing hazardous waste. Auditors will verify that sites include all required information and conservatively include all potential hazardous waste codes indicated by the acceptable knowledge records. All deficiencies in the acceptable knowledge documentation will be included in the audit report.

Auditors will verify and document that sites use administrative controls and follow written procedures to characterize hazardous waste for newly-generated and retrievably stored wastes. Auditors will review procedures used by the sites to confirm acceptable knowledge information using radiography or visual examination, headspace gas sampling and analysis, and homogeneous waste sampling and analysis. Procedures to document changes in acceptable knowledge documentation and changes to hazardous waste code assignments to specific waste streams also will be evaluated for compliance with the WAP (Permit Attachment B).

After the audit is complete, the Permittees will provide the site with preliminary results at a close-out meeting. The Permittees will prepare a final audit report that includes all observations and findings identified during the audit. Sites shall respond to all audit findings and identify corrective actions. Audit results will be included in the final audit report (Permit Attachment B6). If acceptable knowledge procedures do not exist, the required information is not available, or corrective actions (i.e., CARs) are identified associated with acceptable knowledge compilation, acceptable knowledge confirmation, and/or hazardous waste characterization, the Permittees will not manage, store, or dispose TRU mixed waste for the subject waste summary category. Management, storage, or disposal of the subject waste summary category at WIPP will not resume until the Permittees find that all corrective actions have been implemented and the site complies with all applicable requirements of the WAP.

The National TRU Program disseminates information regarding TRU mixed waste characterization requirements and program status through the WIPP Home Page at <http://www.wipp.energy.gov>. The Permittees will use this web page to disseminate information regarding TRU mixed waste streams, RCRA compliance, and operational and programmatic issues, methods development, and waste characterization information, including the application of acceptable knowledge. The Permittees are provided the required waste characterization information prior to management, storage, or disposal of that waste at WIPP and also will conduct audits at least annually. The Permittees will maintain an operating record for review during regulatory agency audits. NMED may also review any information relevant to the scope of the audit during site audits. The Permittees will notify NMED regarding any site's failure to implement corrective actions associated with hazardous waste characterization as specified in Modules I and II and Permit Attachment B3.

#### B4-4 Additional Final Confirmation of Acceptable Knowledge at the WIPP Facility

The Permittees shall require confirmation of acceptable knowledge characterization designations at the site, as stated in Section B4-3(b). In addition and prior to notifying a site that a waste stream can be managed, stored, or disposed at the WIPP facility, the Permittees will review the Waste Stream Profile Forms, the WIPP Waste Information System (**WWIS**), and associated Characterization Information Summary to ensure that radiography or visual examination, headspace-gas sampling and analysis data, and homogeneous waste sampling and analysis data confirm hazardous waste characterization made using acceptable knowledge. The Permittees shall require all sites to provide all of the required data associated with waste stream characterization, including summary acceptable knowledge information, radiography or visual examination, headspace gas sampling and analysis, and homogeneous waste sampling and analysis results. In addition, sites will designate the assigned hazardous waste codes for the waste stream on the waste profile form. The WWIS and associated Characterization Information Summary will be evaluated as illustrated in Figure B4-2 and compared to the

1 hazardous waste codes specified on the waste stream profile form. The Permittees will review  
2 information provided by the sites to ensure that additions to hazardous waste codes are  
3 identified and justified based on data and that hazardous waste codes are included in the Part A  
4 of the WIPP permit application. As part of the reconciliation of data quality objectives (**DQOs**)  
5 (Permit Attachment B3, Section B3-11), sites are required to track and report changes to  
6 hazardous waste characterizations. If data consistently indicates that discrepancies with  
7 acceptable knowledge information were identified at the site level (and were subsequently  
8 reconciled), the Permittees will require sites to reassess the materials and processes that  
9 generate the waste, and resubmit waste stream profile information and implement their  
10 corrective action system. If the Permittees' review of a waste stream profile form and associated  
11 waste characterization data reveal nonconformance with acceptable knowledge requirements  
12 as described in Permit Attachment B3 (i.e. project level nonconformance), the Permittees shall  
13 not manage, store, or dispose of the waste stream until corrective action is taken as specified in  
14 Permit Attachment B3. Repeated nonconformances by a site in implementing and documenting  
15 WAP requirements (Permit Attachment B) will result in the termination of management, storage,  
16 or disposal of the site's waste, waste stream(s), or summary category group(s), as applicable.  
17 Management, storage, or disposal of the subject waste summary category at WIPP will not  
18 resume until the Permittees find that all corrective actions have been implemented and the site  
19 complies with all applicable requirements of the WAP.

20 Any drum with unresolved discrepancies associated with hazardous waste characterization will  
21 not be managed, stored, or disposed at the WIPP facility until the discrepancies are resolved.  
22 The Permittees shall require the sites to reassess the materials and processes that generate  
23 the waste, and headspace-gas sampling and analysis, radiography or visual examination, and  
24 homogeneous waste sampling and analysis results. All shipments of the subject waste stream  
25 will cease until the corrective action(s), as necessary, have been implemented and the  
26 discrepancy resolved. The Permittees will notify NMED when the certification status of a waste  
27 stream at a site is revoked. Waste characterization and certification authority will not be  
28 reinstated until the site demonstrates all corrective actions have been implemented and the  
29 program is reassessed by the Permittees.

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## FIGURES

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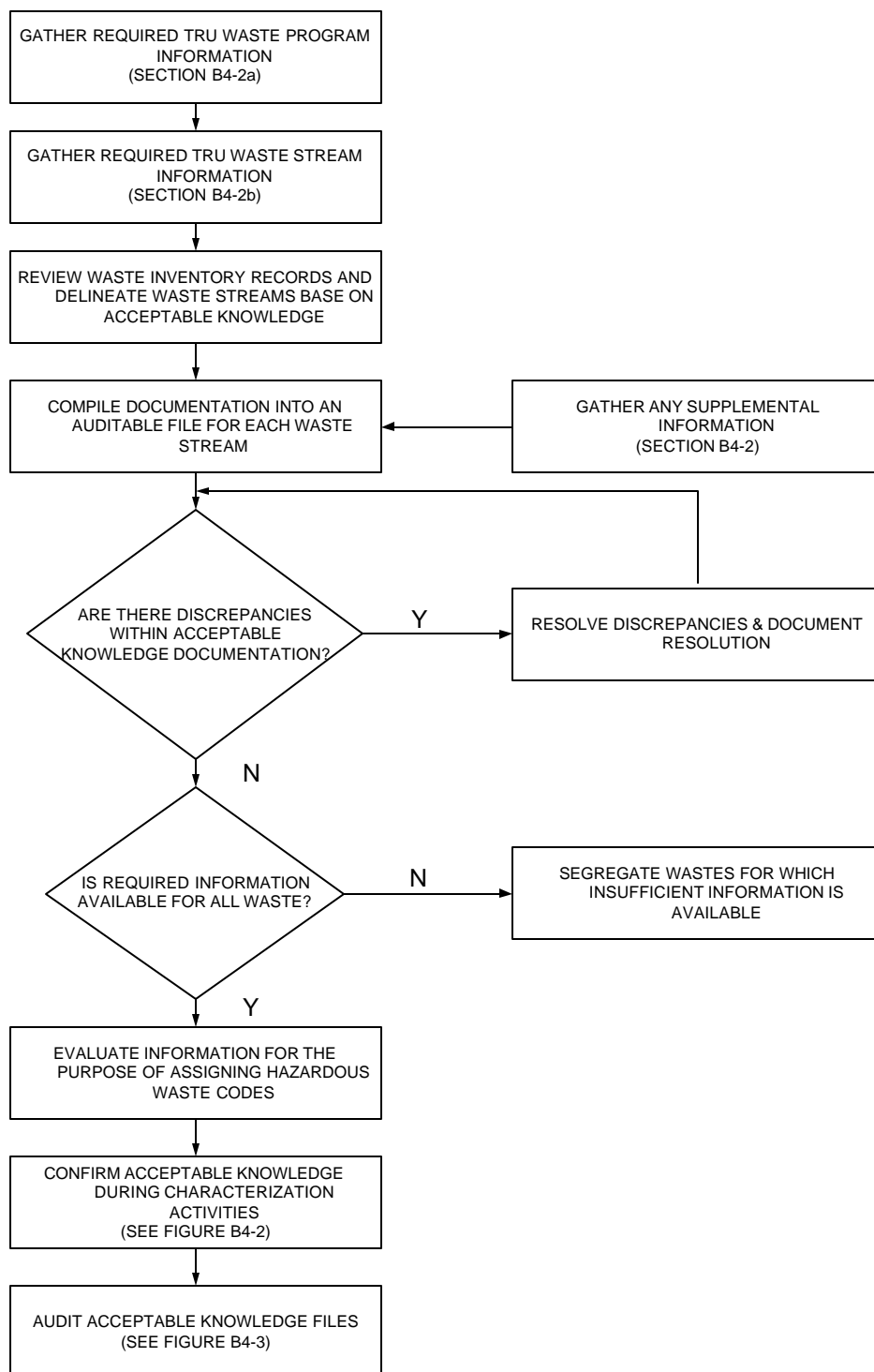


Figure B4-1  
Compilation of Acceptable Knowledge Documentation

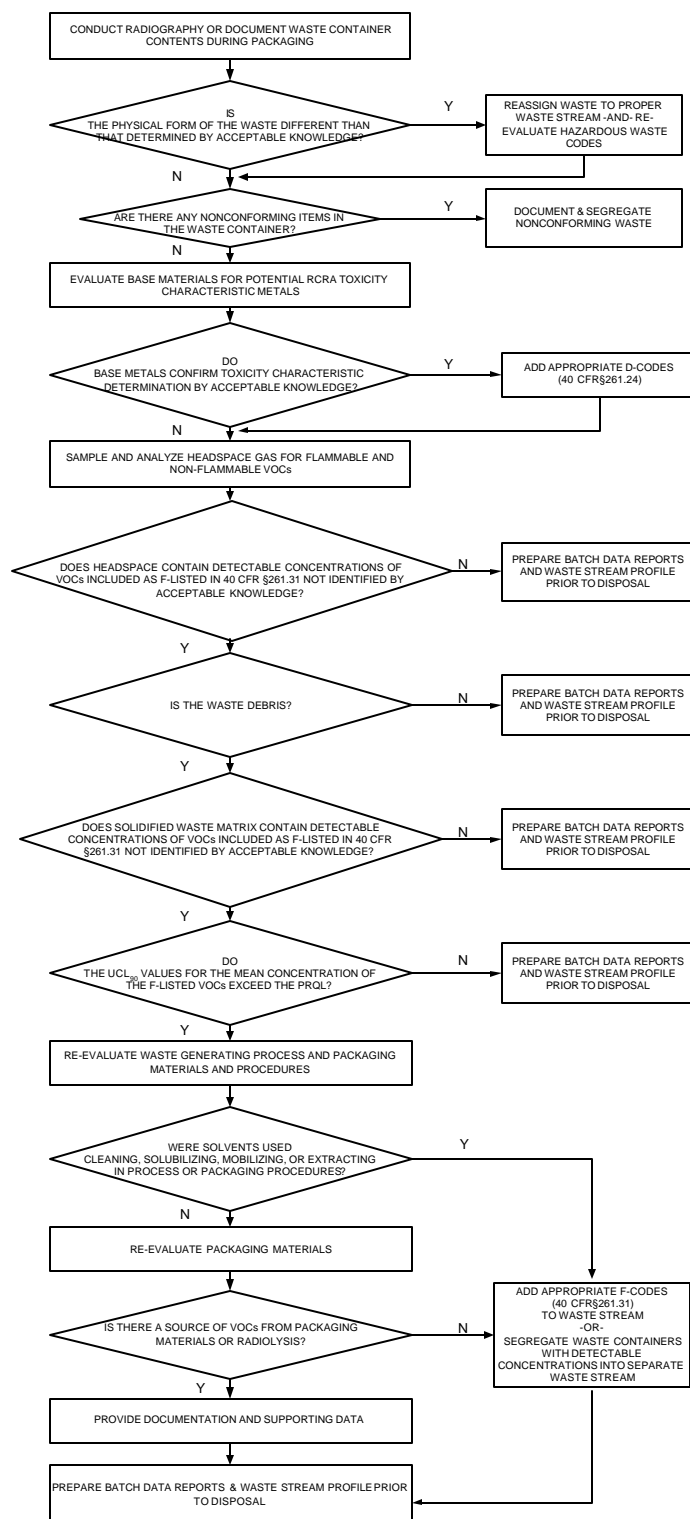


Figure B4-2  
Confirmation of Acceptable Knowledge

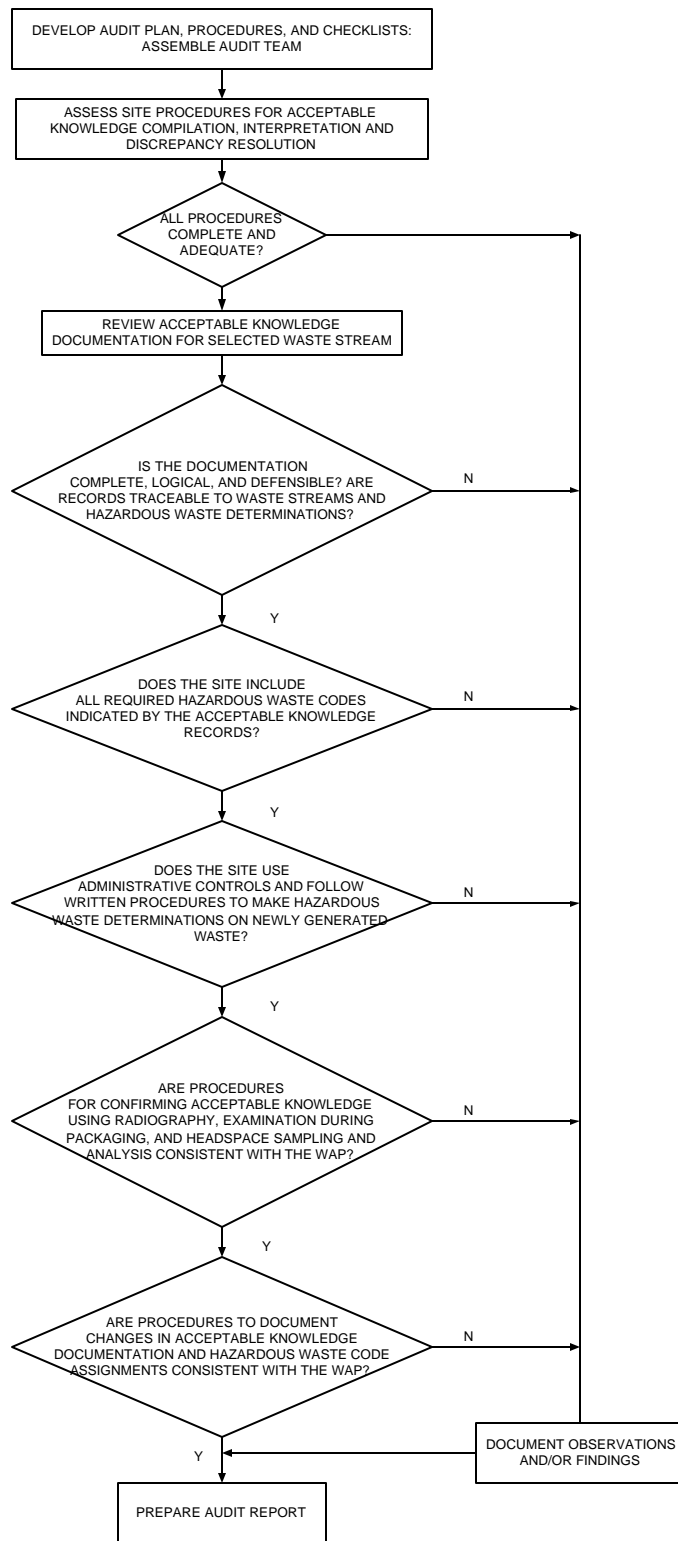


Figure B4-3  
Acceptable Knowledge Auditing